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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>	DATE <b>February 1997</b>
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<b>BUDGET ACTIVITY</b> <b>4 - Demonstration and Validation</b>	<b>PE NUMBER AND TITLE</b> <b>0603871C National Missile Defense</b>	<b>PROJECT</b> <b>2400</b>
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COST (\$ In Thousands)	FY 1996 Actual	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	Cost to Complete	Total Cost
2400 National Missile Defense	730,656	828,864	504,091	393,085	309,748	309,584	391,858	392,433	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

The objective of the National Missile Defense (NMD) program is to develop and maintain the option to deploy a cost effective, operationally effective, and Anti-Ballistic Missile (ABM) Treaty compliant system that will protect the United States against limited ballistic missile threats, including accidental or unauthorized launches or Third World threats. In mid 1993, the Department of Defense (DoD) conducted a Bottom-Up Review (BUR) to select the strategy, force structure, and modernization programs for America's defense in the post-Cold War era. With the dissolution of the Soviet Union, the threat to the U.S. homeland from a deliberate or accidental ballistic missile attack by states of the former Soviet Union (FSU) or the Peoples Republic of China (PRC) was judged to be highly unlikely. In addition, the ability of Third World countries to acquire or develop a long range ballistic missile capability in the near future was considered uncertain. As a prudent approach for responding to this uncertain threat, the Department pursued a technology readiness strategy for National Missile Defense (NMD) to develop and maintain the ability to deploy ballistic missile defenses for the United States should a threat emerge.

In February 1996, the Department completed a comprehensive Ballistic Missile Defense Program Review that addressed changes that have occurred in the ballistic missile defense environment since the 1993 BUR. For the NMD program, the findings of this review resulted in an adjustment to the goal of the NMD program and a corresponding adjustment to the Future Years Defense Program which now includes additional resources in FY96-FY98 for NMD. The revised goal of the NMD program is to develop, within three years, elements of an initial NMD system that could be deployed within three additional years after a deployment decision. This approach is commonly referred to as the NMD "3+3" program. The path towards accomplishing this goal includes: providing a near-term focus to reduce program risk; providing a hedge against the potential of more sophisticated emerging threats; and conducting an integrated NMD system test not later than FY99. All development efforts will be broadly based to preserve deployment option flexibility for a future decision on deployment of an ABM treaty compliant NMD system.

To achieve this goal, BMDO has initiated an NMD Deployment Readiness Program. In April 1996 the USD(A&T) initiated steps to designate NMD as an Acquisition Category (ACAT) 1D program and in July 1996 the program successfully completed its first Overarching Integrated Product Team (OIPT) review. The intent of the NMD Deployment Readiness Program is to position the U.S. to respond to a strategic missile threat as it emerges by shifting emphasis from technology readiness to deployment readiness. This approach focuses on demonstrating an NMD system level capability by FY99, and being able to deploy that capability within an additional three years, if required to do so by the threat. If no threat materializes at the end of the three year development period, evolutionary development will continue on a path towards an objective system capability and the program will continue to maintain the ability to deploy within three years after a decision is made to do so. With this approach, no commitment to deploy is made until the threat emerges.

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<p>The NMD system is composed of several elements which are required to perform the key functions involved in a ballistic missile defense engagement. The Ground Based Radar (GBR) and the Space Based Infrared System (SBIRS) Low component (previously known as the Space and Missile Tracking System) provide the dual sensor phenomenology required to address the full spectrum of potential threats. In addition, Upgraded Early Warning Radars (UEWR) are candidate sensors in the event of an early NMD deployment within three years of the FY99 NMD integrated system test. SBIRS, which will provide midcourse tracking of targets, is currently managed and funded by the Air Force. The Ground Based Interceptor (GBI) is the weapon element that engages and destroys the threat. The Battle Management/Command, Control, and Communications (BM/C3) element provides engagement planning and human-in-control management of the engagement.</p> <p>Concurrent with the development of these elements, technology development efforts focused on achieving an early NMD capability and providing a path to future enhanced capabilities are being prioritized and funded to the extent possible. In addition, several related activities are being performed in support of the development of the NMD system. System Engineering develops the NMD system-level performance and integration requirements and flows these requirements down to the individual elements. NMD Integration activities integrate the individual elements into a unified and coordinated NMD system. Deployment Planning activities focus on the planning required to field the NMD system. Test and Evaluation activities provide management of the NMD T&amp;E program. And Program Support provides overall program management and analysis support. All NMD activity areas are described in more detail below.</p> <p>GBR is the primary fire control sensor, providing surveillance, acquisition, tracking, discrimination, fire control support and kill assessment for the NMD system. Prior to commitment of interceptors, the radar performs surveillance autonomously or as cued by SBIRS Low or other sensors, and will acquire, track, classify/identify and estimate trajectory parameters for targets. In post-commit, the radar will discriminate and track the target(s), and provide via the In-Flight Interceptor Communications System (IFICS) an In-Flight Target Update (IFTU) and a Target Object Map (TOM) to the interceptor(s). The GBR is an incremental development program derived from the former NMD-GBR program and will leverage the Theater Missile Defense GBR program to resolve the critical radar issues applicable to NMD. A GBR prototype, designated as GBR-P, will be installed at USAKA in FY98 and will be available as part of the FY99 NMD integrated system test (IFT-5).</p> <p>UPGRADED EARLY WARNING RADARS incorporate the software upgrades and modest hardware changes required by the existing Early Warning Radars to support the NMD mission. The UEWRs will detect, track and count the individual objects in a ballistic missile attack early in their trajectory. The UEWR data can be used for interceptor commit and GBR cueing in the event of an early deployment. Depending on the anticipated threat (East Coast or West Coast) at the time of a defense deployment decision, the appropriate BMEWS and/or PAVE PAWS radars will be upgraded for inclusion in the NMD architecture. If needed, other existing forward based radars (such as Cobra Dane or HAVE STARE) could also be used to support NMD.</p> <p>The GROUND BASED INTERCEPTOR is using an evolutionary acquisition strategy to develop and demonstrate the NMD interceptor capability, with an emphasis on accomplishing the NMD integrated system test in FY99. The initial focus of GBI development is the exo-atmospheric kill vehicle (EKV) which is the most critical and technically challenging part of the GBI. Development of an EKV booster and the associated launch control equipment will begin in FY98. Until booster development is complete, EKV flight tests will be flown on the Payload Launch Vehicle (PLV), which is a booster consisting of a Minuteman II second and third stage. EKV sensor flight tests are scheduled for FY97 and EKV interceptor flight tests are scheduled for FY98 and FY99. The two current EKV contractors will be downselected to one in FY98.</p>		
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<p>The BATTLE MANAGEMENT, COMMAND, CONTROL AND COMMUNICATIONS activity uses an evolutionary approach to incrementally prototype the BM/C3 functionality required for the NMD mission, and integrate and demonstrate an NMD system in step with evolving NMD sensors and interceptor element capabilities. BM/C3 prototypes will be integrated and demonstrated at the Joint National Test Facility (JNTF) with USSPACECOM/NORAD user participation to refine and focus the BM/C3 development and system behavior. NMD BM/C3 supports the NMD command and control process required to provide human-in-control; develop, assess, and select missile defense strategies and tactics; fuse and correlate available sensor information for discrimination; integrate and plan the complimentary coordination of NMD sensors and interceptors for maximum system performance and kill assessment; provide interface with existing and planned C3 systems; prototype an In-flight Interceptor Communications System (IFICS) for BM/C3-GBI communication.</p> <p>SYSTEM ENGINEERING translates user requirements into NMD system-level performance and integration requirements and flows them down to the individual program elements. This results in a balanced system capability, and readiness through incremental element development on a path to an objective system deployment capability. Throughout this process, systems engineering interacts with and ultimately defines the architecture required to meet and defeat whatever the prescribed threat may be. System engineering is an integral part of the components performance verification, test planning and analysis, deployment planning, user concept of operations (CONOPS) development and evaluation, and command and control (C2) simulation analysis activities. This effort includes interaction with the user with respect to operational requirements, CONOPS, integration of multi-sensor systems, and operational evaluation of R&amp;D activities in support of command and control (C2) simulations. Analyses, simulations, and tests are performed to address the system effectiveness and concept of operations of proposed NMD system architectures against near- and far-term ballistic missile threats. These results support activities required for strategic C2 simulations where the CINCs identify roles, missions and requirements for an effective NMD system.</p> <p>NMD INTEGRATION activities focus on integrating the individual NMD elements into a cohesive NMD system. The Lead System Integrator (LSI) will have responsibility for integrating the GBI; developing, integrating and demonstrating the NMD system; and developing NMD deployment options. Parallel concept definition study contracts will be awarded in FY97, with downselect and contract award to a single LSI contractor in FY98.</p> <p>DEPLOYMENT PLANNING activities focus on planning and logistics activities which support a decision to deploy, and the deployment of the NMD system if a deployment decision is made. The deployment planning effort will be captured in the NMD Integrated deployment Plan. Deployment planning activities also include the identification of critical actions and timelines for fielding the NMD system, the identification of actions that would mitigate the risks to deployment, and initial planning for life cycle logistics support. Other efforts include environmental analyses and documentation, site activation planning, human systems integration, site analyses, industrial base assessments and operational suitability assessments.</p> <p>TEST AND EVALUATION activities involve providing the planning and management to support the NMD test and evaluation program. Some test infrastructure is provided including the Integrated System Test Capability (ISTC) for NMD HWIL testing and simulation activities, and development and validation of targets for NMD sensor and EKV intercept tests. Planning includes overseeing the development and coordination of documentation essential to the conduct of testing -- the overall test strategy, the Cost Analysis Requirements Document (CARD), detailed test plans, interface control documents, lethality plans, post-test data analysis</p>		
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<p>plans, and simulation validation, verification and accreditation (VV&amp;A). Management activities include development of the NMD Test and Evaluation Master Plan (TEMP), review and analysis of test results, and coordination of test assets.</p> <p>SENSOR TECHNOLOGY focuses on the development of advanced technologies in infrared focal planes, cryogenics, radiation hardened electronics and signal processing, and optics hardware for the objective SBIRS Low satellite system. Research and development of components, devices and sub-systems required for the SBIRS Low system will continue, supportive technologies in infrared focal plane testing, cryocooler development and radiation testing of electronics and optics hardware will be pursued.</p> <p>PROGRAM SUPPORT provides management and analysis support to the NMD programs in areas such as cost/schedule/performance assessments, cost estimating and analysis, budget analysis and formulation, program planning and control, and contract management.</p> <p>OTHER NMD INITIATIVES addresses the USAF NMD initiative to fully explore the USAF NMD concept, including utilizing test facilities which provide a realistic and representative test scenario. Specific activities remain under review but may include performing sensor track/data fusion, transmitting in-flight target updates and target object maps to an interceptor, acquiring targets with a sensor package, and demonstrating that the launch control system meets or exceeds NMD timeline requirements.</p> <p>PHENOMENOLOGY provides the U.S. with the capability to generate high confidence target signatures for ballistic missile defenses. This is a critical adjunct to the design and evaluation of NMD system performance across the full spectrum of threats and engagement scenarios. This program provides signature collection sensors for live-fire missions and storage of the resulting test data. This program provides predictive models of target signatures and develops algorithms for the critical functions of discrimination, target handover and aimpoint selection.</p> <p>ARCHITECTURE ANALYSIS/BMC3 INITIATIVES supports an initiative to ensure that system architecture and BM/C3 are addressed in a coordinated and synergistic manner across all NMD and TMD efforts. Systems analysis work is done to determine the expected operational effectiveness and life cycle cost impacts of the NMD system based on changing threats, mission requirements, acquisition reform initiatives and advances in technology. It includes implementation within BMDO of DoD initiatives in C4ISR architectures, technical architecture and open systems.</p> <p>THREAT AND COUNTERMEASURES defines potential adversary missile forces which the NMD system could confront. This includes 1) Intelligence threat description in the form of an annual report, the NMD System Threat Assessment (NMDSTA); 2) Threat scenario generation; and 3) Countermeasure integration, which integrates countermeasures (CM) technology into NMD elements.</p> <p>MODELING AND SIMULATION provides for the development and validation of modeling and simulation (M/S) tools and techniques. This project provides supercomputing resources at the Joint National Test Facility (JNTF) and the Advanced Research Center/Simulation Center (ARC/SC), and the engineering expertise and integration support to operate these facilities.</p>		
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<p>TEST RESOURCES provides the infrastructure to support the NMD test and evaluation program. Test infrastructure includes common test ranges and instrumentation, and common test beds for NMD HWIL testing and simulation activities. Common ground test facilities include: Kinetic Kill Vehicle Hardware-in-the-Loop Simulator (KHILS) at Eglin AFB, FL; Hypervelocity Wind Tunnel Number 9 at the Naval Surface Warfare Center, White Oak, MD; National Hover Test Facility (NHTF) at Edwards AFB, CA; Kinetic Energy Weapon Digital Emulation Center at Huntsville, AL; Aero optic Evaluation Center (AOEC) at Calspan Corp, Buffalo, NY; Center for Research Support (CERES) at Falcon AFB, CO; Army Missile Optical Range (AMOR) at Huntsville, AL; 7V and 10V chambers at Arnold Engineering Development Center (AEDC) in Tullahoma, TN; Portable Optical Sensor Tester (POST) and Characterization of Low Background Mosaics (CALM) at Rockwell International in Anaheim, CA; Naval Research and Development (NRaD) at the Naval Command, Control and Ocean Surveillance Center in San Diego, CA; and infrared and blackbody standards at the National Institute of Standards and Technology (NIST) in Gaithersburg, MD. Common range facilities include Kwajalein Missile Range (KMR) in the Marshall Islands; Western test Range (WRT) at Vandenburg AFB, CA; and the Pacific Missile Range Facility (PMRF) at Kauai, HI. Common range instrumentation includes special test equipment, data collection assets and range instrumentation upgrades including: High Altitude Observatory (HALO) with the Infrared Imaging System (IRIS) based at Aeromet, Inc. in Tulsa, OK; the Remote Area Safety Aircraft (RASA) based at Point Mugu, CA; the SeaLite Beam Director (SLBD) at White Sands Missile Range, NM; KMR improvements and modernization; and the Kwajalein Mobile Range Safety System (KMRSS).</p> <p>OPERATIONAL SUPPORT provides personnel and related support costs common to all NMD projects including support to the Office of the Director, Ballistic Missile Defense Organization (BMDO) and his staff located in Washington, DC, as well as BMDO's Executing Agents within the U.S. Army Space and Strategic Defense Command, U.S. Army PEO Missile Defense, U.S. Navy PEO for Theater Defense, U.S. Air Force PEO office and the Joint National Test Facility. This project supports funding for overhead/indirect personnel costs, benefits and infrastructure costs such as rents, utilities and supplies.</p> <p>This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.</p> <p><u>FY 1996 (\$ in Thousands)</u></p> <ul style="list-style-type: none"> <li>- \$87,000      GBR: Complete contract modification to incorporate a growable antenna design into the NMD prototype radar. Complete fabrication of transmit/receive modules. Conduct environmental, facility, and site analysis at USAKA; develop facility requirements documentation and Electromagnetic Radiation/Electromagnetic Interference (EMR/EMI) analysis. Award facility construction contract and begin construction at USAKA. Continue development of software Realtime Digital Simulation (RDS) and Hardware In the Loop (HWIL) simulation. Fabricate, integrate and begin near-field verification testing of pilot antenna array. Procure remaining piece parts for the GBR-P antenna. Conduct Preliminary Design Review (PDR).</li> <li>- \$8,490      UEWR: Conduct realtime missile tracking experiments using EWR. Define, develop and demonstrate the feasibility and utility of modifying EWR and other existing sensors for NMD mission support. Award UEWR Demonstrator contract.</li> </ul>		
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– \$259,764	<p>GBI: Integrate EKV sensors with PLV boosters and interface the missile with the test range. Acquire long-lead PLV booster hardware for FY98 kill vehicle flight tests and fabricate upper stage. Interface with BM/C3 element for FY98 flight tests. Fabricate EKV seeker, avionics processor, structure, and propulsion subsystems for the competitive FY98 kill vehicle flight test. Conduct software CDR. Integrate hardware and software, and conduct HWIL and simulations on the EKV flight test vehicle. Reactivate U.S. Army Kwajalein Atoll (USAKA) GBI facilities and supporting activities. Resume SHIELD silicon FPA readout electronics and hardening design work. Continue PET HgCdTe FPA development, focusing on reduced size readout electronics. Conduct 20/44 GHz transceiver preliminary brass board demonstration, including ground-to-ground test range demo. Continue development of a lightweight, low cost vectorable nozzle. Execute simulated high altitude booster nozzle static firing.</p>	
– \$72,160	<p>BM/C3: Conduct BM/C3 engineering and integration activities to support BM/C3 Prototype development, BM/C3 communications component prototype development and NMD system integration activities. Develop and demonstrate the BM/C3 Legacy Plus capability. Start development of the first increment of the BM/C3 Prototype. Support NMD tests by providing integrated BM/C3 products as test articles. Use Minuteman III FOT&amp;E flights as targets of opportunity for BMC3 development. Support IGT-2. Develop contract requirements package for the In-Flight Interceptor Communications System (IFICS).</p>	
– \$56,038	<p>System Engineering: Assess and translate user requirements into system requirements documents based on the updated Capstone ORD/CRD and CONOPS. Baseline interface and configuration control requirements in support of the NMD Deployment Readiness Program. Analyze and update contingency deployment options. Provide system level requirements to test execution of ISTC-1 and -2 and IFT-1. Analyze and validate results of IGT-2. Support preparations for IFT-1, IFT-2, and ISTC-1 and -2. Update technical documentation baseline (NMD Capability Assessment, NMM, and NSEN/IDN) and JNTF system simulations based upon test results to date. Conduct NMD System Requirements Review (SRR) to define the NMD Capability 2 (C2) architecture.</p>	
– \$11,475	<p>Deployment Planning: Modify NMD deployment plans based on NMD deployment readiness program developments for early options. Conduct critical path analysis of NMD deployment options and determine pre-deployment timeline reduction activities. Integrate systems operational suitability planning activities into NMD engineering integration and test programs. Support NMD integrated systems tests by providing analytical and planning support. Conduct deployment logistics and sustainment support analysis for the deployment options. Conduct site, facility and environmental tasks to preserve three year deployment timeline.</p>	
– \$70,385	<p>Test and Evaluation: Supported ISTC integration testing and integration of BM/C3 Legacy Plus configuration into the ISTC. Began the production of the NMD TEMP and CARD with the support of the NMD System T&amp;E Program Integrated Product Team (PIPT). Coordinated test range infrastructure and upgrades to support IFT-1 and IFT-2 scheduled for launch from KMR in FY97. Completed integration and launch of MSX targets on STARS/ODES and participated in MSLS demonstration launch. Completed target builds for IFT-1 and IFT-2.</p>	
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– \$87,806	<p>Sensor Technology: Delivered two lots of HgCdTe LWIR FPA hybrids from each contractor for performance testing and verification. Initiated/continued endurance testing on 150K PSC and 35/60K pulse tube and Stirling coolers. Delivered three 60K PSC units for characterization and endurance testing. Initiated advanced optical coating development. Completed fabrication and testing of ultra high performance 12 bit analog-to-digital converter. Completed radiation hardened 1Mbit static random access memory development. Completed board-level demonstration of rad-hard, fault tolerant 32-bit microprocessor and associated support circuits to verify function and performance. Initiated cryocooler thermal bus effort to support thermal integration and heat removal. Launched the MSX satellite and began data collection experiments. Delivered cryocoolers, MWIR filters and IR calibration source for STRV-2 flight experiment.</p>	
– \$20,902	<p>Program Support: Continue to provide management and analysis support to the NMD program in areas such as cost/schedule/performance assessment, cost estimating and analysis, budget analysis and formulation, program planning and control, contract management.</p>	
– \$18,741	<p>Phenomenology: Provided Airborne Surveillance Testbed (AST) core support for MSX Dedicatated Targets (MDT-1, MDT-2) and Red Tigrs III missions to collect optical data. Populated NMD target database. Developed five discrimination algorithms for GBR-P. Archived and distributed MSX data.</p>	
– \$3,051	<p>Architecture Analysis/BMC3 Initiatives: Evaluated the capability of an evolving NMD architecture, the SMTS sensors under development, RV/decoy discrimination techniques, and the application of advances in TMD component technology to NMD systems. Defined BM/C3 architectural and development process requirements to facilitate the translation of operational requirements to interoperable, affordable, evolvable, and supportable systems. Provided mission area capability to address emerging BM/C3 requirements issues and facilitate their resolution in a synergistic manner.</p>	
– \$7,945	<p>Threat and Countermeasures: Provided NMDSTA and operational threat environment intelligence estimates, continued development of threat system scenario descriptions, upgraded threat modeling capability and digital media threat products. Performed counter-countermeasure parametric studies, supported teams conducting CM concept, design, and flight tests, and began design work on dedicated countermeasures flight experiment.</p>	
– \$16,041	<p>Modeling and Simulation: Provided supercomputing resources and staff capability at the JNTF, continued to plan and conduct wargames, conducted command and control simulations (C2sims), developed and operated the NMDSim tool and BMD Simulation Support Center (SSC). Provided supercomputing resources at the ARC/SC to develop and operate a multiple experiment test bed for ISTC testing, and other modeling and simulation support.</p>	

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– \$10,858	Test Resources: Achieved IOC for the 10V space chamber. Provided ground test facility infrastructure and upgrades; digital emulation and analytic support at KDEC, IR seeker HWIL testing at KHILS, wind tunnel testing at Tunnel 9, shock-tunnel testing at AOEC, hover test and NMD safety net integration and flight support capability at NHTF, command/control technology experiments at CERES, sensor testing at POST, CALM, NRaD, and AEDC 7V/10V, phenomenology characterization at AMOR and KHILS, and primary IR standards at the NIST.	
– \$730,656	Total	
<u>FY 1997 (\$ in Thousands)</u>		
– \$66,129	GBR: Conduct CDR and baseline the NMD-GBR-P Design. Begin assembly and testing of antenna subarrays. Continue facility construction with a Joint Occupancy Date in 3QFY97. Begin integration and installation of the GBR-P at USAKA. Begin modifications to the TMD-GBR Dem/Val radar for NMD uses. Deliver RDS and HWILS to support software validation and Integrated Ground Tests (IGTs). Deliver Software Block 1 and 2.	
– \$12,122	UEWR: Initiate UEWR upgrade development. Recommended EWR upgrade solution will be determined by evaluating the feasibility, effectiveness and cost of hardware and software options for modifying EWRs to support NMD. Targets of opportunity will be supported in coordination with NMD test and evaluation, system engineering and BMC3 efforts. Potential ISTC use of existing EWR HWIL assets will be assessed. Potential use of Forward Based X-Band Radar will be assessed.	
– \$236,319	GBI: Conduct two EKV sensor flight tests (IFT-1 and IFT-2), complete data analysis, and incorporate any required changes in preparation for the FY98 and FY99 intercept flight tests. Complete fabrication, assembly, and testing of EKV hardware for the FY98 flight test. Continue EKV/PLV booster hardware and software integration, flight qualification, and acceptance testing. Acquire long-lead PLV booster hardware for FY99 EKV flight tests. Update and validate EKV sensor, kill vehicle models and simulations based on seeker flight data. Continue SHIELD program to develop 256X256 silicon FPAs. Complete phase I transceiver package development and transfer effort to EKV prime contractors. Initiate development/fabrication/testing of EKV transceivers and IFICS modem suitable for use in the FY99 NMD integrated system test. Continue PET program to develop HgCdTe FPAs.	
– \$50,576	BM/C3: Conduct BM/C3 engineering and integration activities to support BM/C3 prototype development, BM/C3 communications component prototype development and NMD system integration activities. Complete development of the first and second increment of the BM/C3 prototype, fully integrated with current increments of other BM/C3 components and with applicable external systems. Start development of BM/C3 prototype third increment. Support NMD tests by providing integrated BM/C3 products as test articles. Support IFT-1, IFT-2, ISTC Integration Tests-1 and -2, and IGT-1A. Deliver IFICS test assembly to support NMD tests.	
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– \$42,542	System Engineering: Evaluate and refine user requirements into system requirements documents (SRDs), Element Requirement Documents (ERDs), and Interface Requirement Documents (IRDs) based on updated Capstone ORD/CRD and CONOPS. Refine interface and configuration control requirements. Analyze and update contingency deployment options and continue to provide systems analysis in support of objective contingency deployment. Analyze and validate results of IFT-1, IFT-2, ISTC-1, and ISTC-2. Support preparations for IFT-3, IFT-4 and the NMD integrated system test (IFT-5). Update technical documentation baseline (NMD Capability Assessment, NMM and NSEN/IDN) and JNTF system simulations based upon test results to date.	
– \$58,046	NMD Integration: Issue Request for Proposal for system integrator concept definition contracts. Make multiple contract awards and initiate parallel concept definition studies with up to three contractors.	
– \$17,139	Deployment Planning: Complete the initial NMD Integrated Deployment Plan and initial Site Activation Plan. Continue preliminary site activation planning. Assess the operational suitability requirements and the compliance of the NMD system and elements. Develop NMD Master Integrated Program Schedule for the development and deployment of the NMD system. Develop environmental compliance plan for the NMD system. Conduct deployment and logistics assessments in support of the NMD PDR.	
– \$101,599	Test and Evaluation: Support ISTC Integration Tests 1 and 2, and integration of the following functions into the ISTC: BM/C3 Capability Increment 1 and 2; EKV realtime simulation for both contractors; GBR-P testbed; UEWR and X-band radars. Complete and maintain currency of TEMP, CARD and Test Strategy with the support of the NMD System T&E PIPT. Implement V&V plan for ISTC. Complete program documentation, pre-launch preparations and oversee execution of IFT-1 and IFT-2. Evaluate post-test results. Coordinate test range infrastructure and upgrades to support EKV flight tests from KMR. Coordinate range instrumentation upgrades and provide data collection and analysis for NMD testing. Conduct target launch for two EKV sensor flight tests (IFT-1 and IFT-2).	
– \$54,134	Sensor Technology: Initiate advanced optical coating development. Initiate follow-on program for LWIR HgCdTe FPAs and deliver 2 lots of hybrid arrays for testing. Deliver 35/60K PSC for characterization testing. Initiate/continue endurance testing on 150K PSC, 60K PSC, 35/60K PSC, 35K turbo cryocooler and 35/60K pulse tube cryocoolers. Complete prototype rad-hard 4Mbit SRAM. Complete prototype high speed, 14-bit analog-digital converter. Complete prototype rad-hard, fault-tolerant 32 bit processor. Continue non-cryogenic FPA signal processor. Initiate rad-hard visible star tracker effort. Deliver additional 60K PSC cooler. Complete thermal bus effort. Continue the collection and analysis of background and target data from the MSX satellite.	
– \$31,100	Program Support: Continue to provide management and analysis support to the NMD program in areas such as cost/schedule/performance assessment, cost estimating and analysis, budget analysis and formulation, program planning and control, contract management.	

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<b>4 - Demonstration and Validation</b>	<b>0603871C National Missile Defense</b>	<b>2400</b>
– \$52,945	Other NMD Initiatives: The USAF NMD initiative will fully explore the USAF NMD concept, including utilizing test facilities which provide a realistic and representative test scenario. Specific FY97 activities remain under review but may include performing sensor track/data fusion, transmitting in-flight target updates and target object maps to an interceptor, acquiring targets with a sensor package, and demonstrating that the launch control system meets or exceeds NMD timeline requirements.	
– \$19,587	Phenomenology: Provide AST core support for IFT-1, IFT-2, MDT-3 and MDT-4 missions to collect optical data. Receive, archive and distribute test data. Perform optical and radar data analysis of IFT-1, IFT-2, MDT-3 and MDT-4 for NMD system design and test. Develop and analyze higher order discrimination algorithms. Upgrade modeling of radar and IR target signatures.	
– \$1,989	Architecture Analysis and BM/C3 Initiatives: Continue systems analysis work on NMD issues. Provide system-level capability to address emerging BM/C3 architectures and requirements in a synergistic manner across all NMD/TMD efforts and facilitate the translation of operational requirements to interoperable, affordable, evolvable, and supportable systems.	
– \$7,168	Threat and Countermeasures: Provide NMDSTA and operational threat environment intelligence estimates, continue development of threat system scenario descriptions, and upgrade threat modeling capability and digital media threat products. Perform CM concept design and flight tests, continue work on dedicated countermeasures flight experiment.	
– \$32,803	Modeling and Simulation: Provide infrastructure and core capability funding for the JNTF for hardware, software, and systems engineering, and other capabilities for system support, and supercomputing and wargaming resources. Provide maintenance of the SSC, and M/S support in the five primary areas of standardization, assessments, development/modification, computer architecture/ networks, and program management for M/S programs. Provide supercomputing resources at the ARC/SC and validate simulators. Upgrade all computer capabilities and establish a WAN.	
– \$11,554	Test Resources: Provide ground test facility infrastructure and upgrades including: HWIL testing at KHILS, wind tunnel testing at Tunnel 9, shock-tunnel testing at AOEC, hover test and NMD safety net integration and flight support capability at NHTF, command/control technology experiments at CERES, lethality tests at AEDC Range C, sensor testing at POST, CALM, NRaD, and 7V/10V phenomenology characterization and target signatures at AMOR and KHILS, and primary IR and black body calibration standards at the NIST. Provide test range infrastructure and upgrades to support EKV testing. Provide range instrumentation, upgrades, data collection and analysis for BMDO testing. Provide data collection and processing.	
– \$33,112	Operational Support: Continue providing management and support for overhead/indirect fixed costs.	
– \$828,864	Total	
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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE <b>February 1997</b>
BUDGET ACTIVITY <b>4 - Demonstration and Validation</b>	PE NUMBER AND TITLE <b>0603871C National Missile Defense</b>	PROJECT <b>2400</b>
<u>FY 1998 (\$ in Thousands)</u>		
– \$19,536	GBR: Conduct CONUS Readiness Review. Complete facility construction with a Beneficial Occupancy Date in 1QFY98. Complete integration and installation of the GBR-P at USAKA. Conduct USAKA Readiness Review. Deliver Software Block 3. Conduct on-line system verification test in 3QFY98.	
– \$16,745	UEWR: Continue the conduct of real-time missile tracking experiments using EWR and other applicable existing sensors. Provide UEWR Demonstrator for participation in NMD integrated system tests. Continue system development and program risk definition and risk reduction. Manage UEWR portion of the LSI contract.	
– \$127,551	GBI: Conduct one EKV intercept flight experiment (IFT-3). Reduce flight test data and incorporate results into HWIL simulations to prepare for IFT-4. Following EKV downselect, complete the winning contractor's EKV fabrication for IFT-4 and for the NMD integrated system test (IFT-5). Acquire PLV hardware to support FY99 flight testing. Fabricate EKV components for FY00 flight testing. Begin Lead System Integrator booster development. Terminate either the PET or SHIELD FPA development effort, preserving the program which corresponds to the FPA material of the winning EKV contractor.	
– \$43,730	BM/C3: Conduct BM/C3 engineering and integration activities to support BM/C3 Prototype development, BM/C3 communications component prototype development and NMD system integration activities. Complete development of the third increment of the BM/C3 Prototype, fully integrated with current increments of other BM/C3 components and with applicable external systems. Start development of the BM/C3 prototype fourth increment. Support NMD tests by providing integrated BM/C3 products as test articles. Support IFT-3, IGT-1A, and ISTC Integration Test-3.	
– \$41,941	System Engineering: Assess and refine user requirements based on updated Capstone ORD/CRD and CONOPS against system requirements. Finalize interface and configuration control requirements in support of deployment options. Continue to analyze and update contingency deployment planning. Analyze and validate results of IFT-3. Support preparations for IFT-4, IFT-5 and IGT-2A. Update technical documentation (NMD Capability Assessment, NMM, NSEN/IDN) and JNTF system simulations based on test results to date.	
– \$7,085	NMD Integration: Complete parallel system integrator concept definition studies. Downselect to one LSI contractor. Initiate LSI base contract.	
– \$16,613	Deployment Planning: Update the NMD Integrated Deployment Plan and the NMD Site Activation Plan to reflect programmatic changes and refinements in the NMD architecture. Support development of the NMD System Training Plan and System Safety Plan. Efforts will continue in the areas of program and deployment schedule integration, critical path analysis and identification of deployment risk mitigation actions. Continue environmental analyses of candidate deployment sites and required documentation.	
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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE <b>February 1997</b>
BUDGET ACTIVITY <b>4 - Demonstration and Validation</b>	PE NUMBER AND TITLE <b>0603871C National Missile Defense</b>	PROJECT <b>2400</b>
– \$83,705	Test and Evaluation: Support ISTC Integration Test 3 and IGT-1A, and integration of the following into the ISTC: BM/C3 Capability Increment 3; GBI HWIL upgrade, and realtime simulations. Maintain currency of TEMP, CARD and Test Strategy with the support of the NMD System T&E PIPT. Complete program documentation, pre-launch preparations and oversee execution of IFT-3. Evaluate post-test results. Complete VV&A of IFT-3 target and implement accreditation plan for ISTC. Complete lethality and live fire testing plan. Coordinate test range infrastructure and upgrades to support EKV flight tests from KMR. Coordinate range instrumentation upgrades and provide data collection and analysis for NMD testing. Conduct target launch for IFT-3.	
– \$30,278	Sensor Technology: Deliver initial samples of advanced optical coatings for testing. Initiate/continue endurance testing of the 35/60K, 60K, and 150K coolers. Extend cutoff wavelength of LWIR HgCdTe FPAs from current technology. Initiate optics development in contamination control technology. Continue development, fabrication, and test of advanced, radiation-hardened electronic components and packaging technologies for processors, memory, and analog-digital converters. Continue rad-hard visible star tracker development.	
– \$33,465	Program Support: Continue to provide management and analysis support to the NMD program in areas such as cost/schedule/performance assessment, cost estimating and analysis, budget analysis and formulation, program planning and control, contract management.	
– \$13,975	Phenomenology: Provide AST core operating costs for IFT-3 and core support to collect optical data to support NMD. Receive, archive and distribute test data. Continue optical and radar data analysis for NMD system design and test. Provide discrimination algorithms and architectures to GBR, SMTS and GBI programs to handle advanced threats and penails. Validate modeling capabilities in the NMD scenario.	
– \$3,008	Architecture Analysis and BM/C3 Initiatives: Continue systems analysis work on NMD issues. Provide system-level capability to address emerging BM/C3 architectures and requirements in a synergistic manner across all NMD/TMD efforts and facilitate the translation of operational requirements to interoperable, affordable, evolvable, and supportable systems.	
– \$688	Threat and Countermeasures: Provide NMDSTA and operational threat environment intelligence estimates, continue development of threat system scenario descriptions, and upgrade threat modeling capability and digital media threat products.	
– \$22,308	Modeling and Simulations: Provide infrastructure and core capability funding for the JNTF for hardware, software, and systems engineering, and other capabilities for system support, and supercomputing and wargaming resources. Provide supercomputing resources at the ARC/SC, validate simulators, and upgrade all computer capabilities. Provide M/S support in the five primary areas.	

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE <b>February 1997</b>
BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
<b>4 - Demonstration and Validation</b>	<b>0603871C National Missile Defense</b>	<b>2400</b>
– \$11,244	Test Resources: Provide ground test facility infrastructure and upgrades for BMDO testing including: IR sensor HWIL testing at KHILS, wind tunnel testing at Tunnel 9, shock-tunnel testing at AOEC, hover test capability at NHTF, command/control technology experiments at CERES, lethality tests at AEDC Range G, sensor testing at POST, CALM NRaD, and 7V/10V phenomenology characterization and target signatures at AMOR and KHILS, and primary IR and blackbody calibration standards at the NIST. Provide test range infrastructure and upgrades to support EKV testing. Provide range instrumentation, upgrades, data collection, and analysis for BMDO testing. Provide data collection and processing.	
– \$32,219	Operational Support: Continue providing management and support for overhead/indirect fixed costs.	
– \$504,091	Total	
<u>FY 1999 (\$ in Thousands)</u>		
– \$12,141	GBR: Participate in IFT-4 and the NMD integrated system test (IFT-5) with GBR-P in-line. Continue algorithm development. Develop P3I program.	
– \$8,983	UEWR: Continue the conduct of real-time missile tracking experiments using EWR and other applicable existing sensors. Provide UEWR Demonstrator for participation in NMD integrated system tests. Continue Upgraded EWR PDRR phase development and LSI contract management activities.	
– \$77,685	GBI: Participate in IFT-4 and the NMD integrated system test (IFT-5) using EKV. Fabricate EKV for fourth intercept flight (IFT-6), incorporating technology improvements and lessons learned from IFTs 1-4. Acquire PLV hardware to support IFT-6. Continue dedicated booster development and prepare for two propulsion verification tests in FY00. Deliver flight ready SHIELD and PET FPAs and readout electronics. Continue radiation hardened microprocessor, low power analog-to-digital converter, and memory development. Demonstrate 100% operability in center 32x32 detectors of SHIELD focal plane array. Fabricate and test full-scale advanced composite structure with integral ground plane for EKV.	
– \$35,920	BM/C3: Conduct BM/C3 engineering and integration activities to support BM/C3 Prototype development, BM/C3 communications component prototype development and NMD system integration activities. Complete development of the fourth increment of the BM/C3 Prototype, fully integrated with current increments of other BM/C3 components and with applicable external systems. Start and complete development of the fifth BM/C3 Prototype Capability Increment. Support NMD tests by providing integrated BM/C3 products as test articles. Support IGT-2A, IFT-4 and IFT-5.	
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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>		DATE <b>February 1997</b>
BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
<b>4 - Demonstration and Validation</b>	<b>0603871C National Missile Defense</b>	<b>2400</b>
– \$35,559	System Engineering: Assess and refine user requirements based on updated Capstone ORD/CRD and CONOPS against system requirements. Finalize interface and configuration control requirements in support of deployment. Continue to analyze and update contingency deployment planning. Analyze and validate results of IFT-5 and IGT-2A. Support preparations for IFT-6 and IGT-3. Support the NMD Early Deployment Readiness Review in 4th quarter. Update technical documentation (NMD Capability Assessment, NMM, NSEN/IDN) and JNTF system simulations based on test results to date.	
– \$22,336	NMD Integration: Conduct FY99 NMD integrated system test (IFT-5) and support the NMD Early Deployment Readiness Review.	
– \$7,758	Deployment Planning: Refine the NMD Integrated Deployment Plan and the NMD Site Activation Plan to reflect programmatic changes and refinements to the NMD architecture. Prepare deployment assessment for the NMD Early Deployment Readiness Review. Assessment will include all aspects of deployment (industrial base assessment, operational suitability assessment, deployment risk analysis and site activation summary). Complete tactical site design to support deployment review and meet deployment timelines. Update program and deployment schedule information and refine critical path analysis of the NMD system.	
– \$52,538	Test and Evaluation: Support five month long IGT-2A campaign. Maintain currency of TEMP, CARD and Test Strategy with support of the NMD System T&E PIPT. Complete program documentation, pre-launch preparations and oversee execution of IFT-4 and IFT-5. Evaluate post-test results. Complete VV&A of IFT-4 and IFT-5 targets and fully accredit the ISTC. Implement lethality and live fire testing plan. Coordinate test range infrastructure and upgrades to support EKV flight tests from KMR. Coordinate test range instrumentation upgrades and provide data collection and analysis for NMD testing. Conduct target launches for IFT-4 and IFT-5.	
– \$32,316	Sensor Technology: Deliver final samples of advanced optical coatings for testing. Deliver 2 lots of LWIR HgCdTe FPAs with extended wavelength cutoff. Initiate silicon FPA development to very long wavelength regime. Initiate continuous 10K sorption cooler effort. Continue endurance testing on 150K, 60K, and 35/60K PSC cryocoolers. Deliver prototype contamination control device. Initiate silicon carbide telescope effort. Continue development, fabrication, and test of advanced, radiation-hardened electronic components and packaging technologies for processors, memory and analog-digital converters. Deliver prototype non-cryogenic FPA signal processor. Continue rad-hard visible star tracker effort. Deliver rad-hard electrically erasable programmable read-only memory (EEPROM). Provide predicted and exploited signature data for test planning and systems effectiveness tasks.	
– \$24,704	Program Support: Continue to provide management and analysis support to the NMD program in areas such as cost/schedule/performance assessment, cost estimating and analysis, budget analysis and formulation, program planning and control, contract management.	
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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE
BUDGET ACTIVITY		PROJECT
<b>4 - Demonstration and Validation</b>	<b>0603871C National Missile Defense</b>	<b>February 1997</b> <b>2400</b>
– \$13,529	Phenomenology: Provide AST core operating costs for IFT-4 and IFT-5 missions to collect optical data. Receive, archive and distribute test data. Continue optical and radar data analysis for NMD system design and test. Provide discrimination algorithms and architectures to GBR, SMTS and GBI programs to handle advanced threats and penaids. Continue delivering validated signature models for high priority engagement scenarios.	
– \$2,973	Architecture Analysis and BM/C3 Initiatives: Continue systems analysis work on NMD issues. Provide system-level capability to address emerging BM/C3 architectures and requirements in a synergistic manner across all NMD/TMD efforts and facilitate the translation of operational requirements to interoperable, affordable, evolvable, and supportable systems.	
– \$657	Threat and Countermeasures: Provide NMDSTA and operational threat environment intelligence estimates, continue development of threat system scenario descriptions, and upgrade threat modeling capability and digital media threat products.	
– \$22,535	Modeling and Simulations: Provide infrastructure and core capability funding for the JNTF for hardware, software, and systems engineering, and other capabilities for system support, and supercomputing and wargaming resources. Provide supercomputing resources at the ARC/SC, validate simulators, and upgrade all computer capabilities. Provide M/S support in the five primary areas.	
– \$11,108	Test Resources: Provide ground test facility infrastructure and upgrades for BMDO testing including: IR sensor HWIL testing at KHILS, wind tunnel testing at Tunnel 9, shock-tunnel testing at AOEC, hover test capability at NHTF, command/control technology experiments at CERES, lethality tests at AEDC Range G, sensor testing at POST CALM, NRaD, and 7V/10/V, phenomenology characterization and target signatures at AMOR and KHILS, and primary IR and blackbody calibration standards at the NIST. Provide test range infrastructure and upgrades to support EKV testing. Provide core support for KMRSS. Provide range instrumentation, upgrades, data collection, and analysis for BMDO testing. Provide data collection and processing by the HALO with the IRIS sensor.	
– \$32,343	Operational Support: Continue providing management and support for overhead/indirect fixed costs.	
– \$393,085	Total	
<p><u>Acquisition Strategy:</u> The NMD program is in a deployment readiness posture that involves developing hardware that will be used in a FY99 integrated system test (IFT-5) intended to demonstrate a National Missile Defense capability. The acquisition strategy is to use current NMD element contractors to complete the development of NMD elements necessary to accomplish this FY99 test, and to award a lead system integrator (LSI) contract in FY98. In addition, contracts are being implemented that will allow for fielding and maintaining an initial NMD system by FY03. Program risk is being reduced by performing the maximum number of system level tests between FY00 and FY03. NMD system performance beyond FY03 will be improved through technology upgrades and the addition of SBIRS Low.</p>		
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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>										DATE <b>February 1997</b>		
BUDGET ACTIVITY <b>4 - Demonstration and Validation</b>					PE NUMBER AND TITLE <b>0603871C National Missile Defense</b>					PROJECT <b>2400</b>		
<b>B. <u>Program Change Summary (\$ in Thousands)</u></b>												
			<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>	<u>Total</u>	<u>Cost</u>				
Previous President's Budget			720,750	508,437	511,495	413,061	2,153,743					
Appropriated Value				833,437								
Adjustments to Appropriated Value:												
a. General Reductions (FFRDC, Inflation etc.)				-4,573								
Current Budget Submit/President's Budget			730,656	828,864	504,091	393,085	2,456,696					
Change Summary Explanation:												
Funding:	Additional resources have been allocated to the NMD program as a result of the FY97 Congressional appropriation.											
Schedule:	N/A											
Technical:	N/A											
<b>C. <u>Other Program Funding Summary (\$ in Thousands)</u></b>												
			<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>To</u>	<u>Total</u>
PE 0603871C NMD MILCON Design			0	0	540	12,815	0	0	0	0	<u>Compl</u>	<u>Cost</u>
												13,355
<b>D. <u>Schedule Profile</u></b>												
			<u>FY 1996</u>		<u>FY 1997</u>		<u>FY 1998</u>		<u>FY 1999</u>			
	1	2	3	4	1	2	3	4	1	2	3	4
<u>Engineering Milestones</u>												
a. GBR-P PDR			X									
b. NMD SRR					X							
c. GBR-P CDR					X							
d. NMD PDR						X						
e. NMD IPR								X				
f. NMD Early Deployment Readiness Review												X
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BUDGET ACTIVITY <b>4 - Demonstration and Validation</b>										PE NUMBER AND TITLE <b>0603871C National Missile Defense</b>					PROJECT <b>2400</b>			
	FY 1996				1	FY 1997				1	FY 1998				1	FY 1999		
	2	3	4	1		2	3	4	1		2	3	4	2		3	4	
<u>Test and Evaluation Milestones</u>																		
g. IGT-2	X																	
h. IFT-1						X												
i. ISTC-1					X													
j. BM/C3 Legacy+				X														
k. BM/C3 Capability Increment 1					X													
l. IFT-2							X											
m. ISTC-2						X												
n. IGT-1A											X							
o. BM/C3 Capability Increment 2									X									
p. IFT-3												X						
q. BM/C3 Capability Increment 3											X							
r. IFT-4																X		
s. ISTC-3												X						
t. IGT-2A														X				
u. BM/C3 Capability Increment 4															X			
v. NMD Integrated System Test (IFT-5)																	X	
w. BM/C3 Capability Increment 5																	X	
<u>Contract Milestones</u>																		
x. GBR-P Contract Mod Implemented	X																	
y. UEWR Demonstrator Contract Award				X														
z. NMD Lead System Integrator Concept Definition RFP Release						X												
aa. NMD Lead System Integrator Concept Definition Contract Awards						X												
bb. NMD Lead System Integrator Downselect to one contractor											X							
cc. EKV Contractor Downselect											X							

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<b>RDT&amp;E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)</b>						DATE <b>February 1997</b>					
BUDGET ACTIVITY <b>4 - Demonstration and Validation</b>				PE NUMBER AND TITLE <b>0603871C National Missile Defense</b>			PROJECT <b>2400</b>				
<b>A. <u>Project Cost Breakdown (\$ in Thousands)</u></b>											
			<u>FY 1996</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>					
NMD Integration			0	58,046	7,085	22,336					
Ground Based Interceptor			259,764	236,319	127,551	77,685					
Battle Management, Command , Control and Communications			72,160	50,576	43,730	35,920					
Ground Based Radar			87,000	66,129	19,536	12,141					
Upgraded Early Warning Radars			8,490	12,122	16,745	8,983					
Systems Engineering			56,038	42,542	41,941	35,559					
Deployment Planning			11,475	17,139	16,613	7,758					
Program Support			20,902	31,100	33,465	24,704					
Test and Evaluation			70,385	101,599	83,705	52,538					
Sensor Technology			87,806	54,134	30,278	32,316					
Other NMD Initiatives			0	52,945	0	0					
Phenomenology			18,741	19,587	13,975	13,529					
Architecture Analysis/BMC3 Initiatives			3,051	1,989	3,008	2,973					
Threat and Countermeasures			7,945	7,168	688	657					
Modeling and Simulation			16,041	32,803	22,308	22,535					
Test Resources			10,858	11,554	11,244	11,108					
Operational Support			0	33,112	32,219	32,343					
Total			730,656	828,864	504,091	393,085					
<b>B. <u>Budget Acquisition History and Planning Information (\$ in Thousands)</u></b>											
<b>Performing Organizations:</b>											
Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1996	Budget FY 1996	Budget FY 1997	Budget FY 1998	Budget FY 1999	Budget to Complete	Total Program
Project 2400											

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RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)										DATE February 1997	
BUDGET ACTIVITY <b>4 - Demonstration and Validation</b>					PE NUMBER AND TITLE <b>0603871C National Missile Defense</b>					PROJECT <b>2400</b>	
Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1996	Budget FY 1996	Budget FY 1997	Budget FY 1998	Budget FY 1999	Budget to Complete	Total Program
<u>Product Development Organizations</u>											
NMD INTEGRATION											
TBD	TBD	FY97	250,000	250,000	0	58,046	7,085	22,336	continues	87,467	
GBI											
Hughes	CPFF	9/90			75,916	82,974	0	0	continues	158,890	
Rockwell	CPFF	9/90			75,056	85,150	0	0	continues	160,206	
TBD (EKV)	CPFF	FY98			0	0	20,310	6,064		26,374	
Lockheed	CPIF	1/86			59,792	37,000	35,000	25,000	continues	156,792	
NRC	CPAF	3/92			6,487	6,685	0	0		13,172	
Sparta	CPFF	8/92			1,790	1,667	0	0		3,457	
ASGI	CPFF	6/89			1,307	0	0	0		1,307	
Mevatec	CPFF	11/93			1,045	0	0	0		1,045	
SY Technology	CPFF	10/96			0	2,290	2,620	2,101	continues	7,011	
TBD (GBI prime)	TBD	TBD			0	0	45,000	28,373	continues	73,373	
Hughes (PET)	CPFF	9/90	26,625	26,625	2,300	0	0	0		2,300	
Liris (PET)	CPFF	9/90	25,425	25,425	2,300	0	0	0		2,300	
TBD (PET)	CPFF	1/97			0	3,000	3,000	3,000	continues	9,000	
Rockwell (SHLD)	CPFF	11/92	6,580	6,580	1,920	2,310	0	0	continues	4,230	
TRW	CPFF	9/95	1,787	1,787	1,457	0	0	0		1,457	
Harris	CPFF	9/95	1,315	1,315	1,102	0	0	0		1,102	
Misc contracts	N/A	N/A			15,814	5,356	9,473	1,162	continues	31,805	
SFAE-MD	N/A	N/A			13,478	9,887	12,148	11,985	continues	47,498	

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RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)										DATE February 1997	
BUDGET ACTIVITY <b>4 - Demonstration and Validation</b>					PE NUMBER AND TITLE <b>0603871C National Missile Defense</b>					PROJECT <b>2400</b>	
Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1996	Budget FY 1996	Budget FY 1997	Budget FY 1998	Budget FY 1999	Budget to Complete	Total Program
BM/C3											
TRW	CPFF	8/24/95	90,550	90,550		42,049	18,759	18,790	16,057	continues	95,655
BDM	CPAF	12/27/94	27,350	27,350		6,250	3,900	5,200	4,000	continues	19,350
SFAE-MD	N/A	N/A				2,521	2,691	2,600	1,900	continues	9,712
USA Corp of Eng	N/A	N/A				1,701	5,000	0	0		6,701
TBE	CPFF	4/24/97	4,100	4,100		0	1,000	1,100	900	continues	3,000
Mitre	FFRDC	Annual	11,724	11,724		2,529	2,800	2,880	2,110	continues	10,319
SENCOM	CPAF	10/1/94	3,975	3,975		1,345	800	825	604	continues	3,574
TRW	CPAF	2/1/95	13,500	13,500		2,395	3,500	2,272	1,736	continues	9,903
Loral	CPAF	2/1/95	7,900	7,900		1,290	1,660	1,113	824	continues	4,887
NSWC	N/A	N/A				300	300	300	150	continues	1,050
Misc Contracts	N/A	N/A				11,780	10,166	8,650	7,639	continues	38,235
GBR											
Raytheon	CPAF	11/94	148,922	148,922		62,022	58,598	15,100	9,697	continues	145,417
TBE	CPAF	3/92				2,476	1,000	0	0		3,476
Colsa	CPFF	6/89				3,430	0	0	0		3,430
GRA	CPFF	7/96				1,100	0	0	0		1,100
Misc contracts	N/A	N/A				2,235	1,831	1,936	944	continues	6,946
SFAE-MD	N/A	N/A				15,737	4,700	2,500	1,500	continues	24,437
UEWR											
Xontech	CPAF	1/3/95	12,600	12,600		4,367	6,429	0	0		10,796
TBD		12/1/97				0	0	11,735	4,583	continues	16,318
USAF/ESC	N/A	N/A				1,300	1,300	1,300	1,300	continues	5,200
Mitre	FFRDC					1,900	3,000	3,360	3,100	continues	11,360
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BUDGET ACTIVITY <b>4 - Demonstration and Validation</b>					PE NUMBER AND TITLE <b>0603871C National Missile Defense</b>					PROJECT <b>2400</b>	
Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1996	Budget FY 1996	Budget FY 1997	Budget FY 1998	Budget FY 1999	Budget to Complete	Total Program
Misc Contracts						923	1,393	350	0		2,666
SENSOR TECH											
Hughes	CPFF	1/90	8,770	8,770		1,950	1,600	0	0		3,550
Analog Devices	CPFF	1/91	9,710	9,710		1,300	1,160	1,100	718	continues	4,278
TBD	CPFF	TBD	8,500	8,500		0	1,000	2,890	3,590	continues	7,480
TBD	CPFF	TBD	17,700	17,700		0	5,000	11,582	8,285	continues	24,867
TBD	CPFF	TBD	8,100	8,100		0	1,000	2,890	2,761	continues	6,651
Phillips Lab	N/A	N/A				1,140	260	1,500	1,000	continues	3,900
Crane	CPAF	3/30/90	1,490	1,490		1,290	0	0	0		1,290
Lockheed Martin	CPAF	1/10/96	1,830	1,830		407	1,000	175	0		1,582
TRW	CPAF	1/90				2,210	925	800	800	continues	4,735
Honeywell	CPAF	1/90				1,120	925	800	800	continues	3,645
Hughes	CPAF	2/93	6,620	6,620		1,470	0	0	0		1,470
Rockwell	CPAF	2/93	6,670	6,670		2,030	0	0	0		2,030
Xontech						1,400	0	0	0		1,400
WPAFB	N/A	N/A				1,600	0	0	0		1,600
JHU/APL	CPFF	10/1/91	165,841	165,841		11,644	0	0	0		11,644
JHU/APL(B)	CPFF	4/1/95	39,894	39,894		7,000	9,938	0	0		16,938
MDA	CPFF	1/2/92	53,169	53,169		1,350	0	0	0		1,350
USU(SP)	CPFF	6/15/88	90,586	90,586		6,852	1,635	0	0		8,487
USU(DPC)	CPFF	8/7/92	20,800	20,800		4,403	3,596	0	0		7,999
NRC	CPFF	12/1/93				5,257	1,627	0	0		6,884
Misc NASA	MIPR	N/A				233	598	0	0		831
USASSDC	N/A	N/A				4,241	580	0	0		4,821
AFSMC	N/A	N/A				10,831	8,509	0	0		19,340
NRL	N/A	N/A				2,309	2,300	0	0		4,609
USASSDC	N/A	N/A				1,556	1,161	1,223	1,223	continues	5,163
JHU/APL	CPAF	6/96	17,000	17,000		5,230	950	0	0		6,180
Misc Contracts						10,983	10,370	7,318	13,139	continues	41,810

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BUDGET ACTIVITY <b>4 - Demonstration and Validation</b>					PE NUMBER AND TITLE <b>0603871C National Missile Defense</b>					PROJECT <b>2400</b>	
Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1996	Budget FY 1996	Budget FY 1997	Budget FY 1998	Budget FY 1999	Budget to Complete	Total Program
<b>OTHER NMD INITIATIVES</b>											
TBD	TBD	TBD				0	52,945	0	0		52,945
<u>Support and Management Organizations</u>											
<b>SYSTEM ENGINEERING</b>											
TRW	CPFF	8/95				38,833	25,605	25,004	25,568	continues	115,010
BDM	CPAF	12/27/94				7,855	7,107	7,107	7,107	continues	29,176
USSPACECOM	N/A	N/A				1,200	1,200	1,200	636	continues	4,236
JNTF	N/A	N/A				3,100	3,300	3,300	1,212	continues	10,912
DNA	MIPR	N/A				1,750	1,750	1,750	0		5,250
ARSPACE	N/A	N/A				800	580	580	318	continues	2,278
AFSPACE	N/A	N/A				500	500	500	189	continues	1,689
USAF/SMC	N/A	N/A				1,500	2,000	2,000	450	continues	5,950
NAVSPACE	N/A	N/A				500	500	500	79	continues	1,579
<b>DEPLOYMENT PLANNING</b>											
TRW	CPFF	8/23/95				2,458	5,000	6,500	4,157	continues	18,115
NIST	MIPR	N/A				492	450	450	875	continues	2,267
SFAE-MD	N/A	N/A				3,130	762	0	0		3,892
USAF/SMC	N/A	N/A				500	230	510	520	continues	1,760
USSPACECOM	N/A	N/A				971	1,500	1,289	543	continues	4,303
TBD	CPFF	FY97				0	2,110	2,610	1,500	continues	6,220
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<b>RDT&amp;E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)</b>										DATE <b>February 1997</b>	
<b>BUDGET ACTIVITY</b>					<b>PE NUMBER AND TITLE</b>					<b>PROJECT</b>	
<b>4 - Demonstration and Validation</b>					<b>0603871C National Missile Defense</b>					<b>2400</b>	
Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1996	Budget FY 1996	Budget FY 1997	Budget FY 1998	Budget FY 1999	Budget to Complete	Total Program
USA Corp of Eng	N/A	N/A			0	4,100	1,750	0			5,850
TBD	CPFF	FY97			0	990	1,000	0			1,990
Misc contracts	N/A	N/A			3,924	1,997	2,504	163		continues	8,588
<b>PROGRAM SUPPORT</b>											
BDM	CPAF	12/27/94			20,902	19,103	11,770	5,699		continues	57,474
SFAE-MD	N/A	N/A			0	8,684	18,390	15,704		continues	42,778
USASSDC	N/A	N/A			0	3,313	3,305	3,301		continues	9,919
<b>PHENOMEN- OLOGY</b>											
Boeing	CPFF	9/95			3,049	3,238	3,406	3,418		continues	13,111
MIT/LL	FFRDC	10/95			5,443	5,410	1,902	1,658		continues	14,413
Xontech	CPFF	10/96			1,666	1,667	0	0			3,333
USASSDC	N/A	N/A			512	658	590	590		continues	2,350
Misc contracts	N/A	N/A			8,071	8,614	8,077	7,863		continues	32,625
<b>ARCH ANALYSIS</b>											
BDM	CPAF	12/27/94			1,070	600	1,070	1,040		continues	3,780
Misc contracts					1,981	1,389	1,938	1,933		continues	7,241
<b>THREAT &amp; CM</b>											
Sandia	N/A	N/A			1,300	1,200	0	0			2,500
MIT/LL	FFRDC	N/A			2,500	1,300	0	0			3,800
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BUDGET ACTIVITY					PE NUMBER AND TITLE					PROJECT	
<b>4 - Demonstration and Validation</b>					<b>0603871C National Missile Defense</b>					<b>2400</b>	
Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1996	Budget FY 1996	Budget FY 1997	Budget FY 1998	Budget FY 1999	Budget to Complete	Total Program
OGAs	N/A	N/A				949	1,046	390	373	continues	2,758
Misc contracts	N/A	N/A				3,196	3,622	298	284	continues	7,400
OPERATIONAL SUPPORT											
Misc operational accounts						0	33,112	32,219	32,343	continues	97,674
<u>Test and Evaluation Organizations</u>											
T&E											
TBE	CPAF	3/92				7,047	4,000	2,000	0		13,047
Colsa	CPFF	6/89				1,200	2,200	1,200	1,200	continues	5,800
Colsa	CPFF	6/89				4,100	13,700	13,300	5,659	continues	36,759
Rockwell	CPFF	9/90				2,200	2,200	2,000	0		6,400
Hughes	CPFF	9/90				2,000	2,200	2,200	0		6,400
SMC	N/A	N/A				1,800	3,400	2,600	2,700	continues	10,500
SFAE-MD	N/A	N/A				5,900	5,560	2,609	1,720	continues	15,789
USASSDC	N/A	N/A				455	14,121	15,664	9,764	continues	40,004
JNTF	N/A	N/A				0	600	1,580	0		2,180
NRL	N/A	N/A				0	100	100	120	continues	320
Misc contracts	N/A	N/A				4,303	13,412	15,949	6,553	continues	40,217
GBI Targets:											
USASSDC	N/A	N/A				339	640	535	1,460	continues	2,974
Sandia	N/A	N/A				10,062	10,118	10,093	10,002	continues	40,275
SMC	N/A	N/A				7,152	1,398	1,750	1,700	continues	12,000
Lockheed						6,988	18,214	10,315	9,115	continues	44,632
Sy Technology						0	625	750	625	continues	2,000

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Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1996	Budget FY 1996	Budget FY 1997	Budget FY 1998	Budget FY 1999	Budget to Complete	Total Program
TBE						722	455	720	620	continues	2,517
TRW						0	1,300	340	1,300	continues	2,940
MSX Targets:											
USASSDC	N/A	N/A				6,975	1,246	0	0		8,221
Sandia	N/A	N/A				6,777	4,894	0	0		11,671
TBE						1,773	177	0	0		1,950
MICOM	N/A	N/A				592	680	0	0		1,272
SMC	N/A	N/A				0	359	0	0		359
Modeling & Sim											
Colsa						2,054	2,073	2,137	2,114	continues	8,378
MRC						720	715	712	705	continues	2,852
USASSDC						1,018	1,107	0	0		2,125
NRL						243	784	242	239	continues	1,508
AFSPACE						148	303	0	0		451
TRW						491	1,445	2,332	2,305	continues	6,573
Loral						5,950	9,450	3,914	3,860	continues	23,174
Mitre						2,110	5,700	1,614	1,622	continues	11,046
JNTF						2,309	10,756	7,339	7,378	continues	27,782
BMDO						998	470	4,018	4,312	continues	9,798
TEST RESOURCES											
USASSDC	N/A	N/A				3,555	1,875	2,908	3,266	continues	11,604
Phillips Lab	N/A	N/A				699	950	1,000	1,000	continues	3,649
Wright Lab	N/A	N/A				1,159	931	1,000	1,000	continues	4,090
Det2-SMC	N/A	N/A				300	300	300	300	continues	1,200
NIST	N/A	N/A				100	100	100	100	continues	400
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<b>4 - Demonstration and Validation</b>					<b>0603871C National Missile Defense</b>					<b>2400</b>	
Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1996	Budget FY 1996	Budget FY 1997	Budget FY 1998	Budget FY 1999	Budget to Complete	Total Program
Arnold Engin.	N/A	N/A				100	2,250	1,525	1,525	continues	5,400
NSWC	N/A	N/A				735	727	725	716	continues	2,903
SPAWAR	N/A	N/A				388	412	410	406	continues	1,616
Misc contracts	N/A	N/A				3,822	4,009	3,276	2,795	continues	13,902
<b>B. Budget Acquisition History and Planning Information Continued (\$ in Thousands)</b>											
<b>Government Furnished Property:</b>											
Item Description	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Delivery Date		Total Prior to FY 1996	Budget FY 1996	Budget FY 1997	Budget FY 1998	Budget FY 1999	Budget to Complete	Total Program
<u>Product Development Property</u>											
<u>Support and Management Property</u>											
<u>Test and Evaluation Property</u>											
Subtotal Product Development						515,220	530,271	244,925	189,381		1,479,797
Subtotal Support and Management						118,152	152,637	141,909	117,523		530,221
Subtotal Test and Evaluation						97,284	145,956	117,257	86,181		446,678
Total Project						730,656	828,864	504,091	393,085		2,456,696
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